Remarks

Applicants respectfully request reconsideration of the present application in view of the foregoing amendments and the following remarks. Upon entry of the present amendment, claims 1, 4, 5, 7-12, 14-22, 25-28, 31-33, 68, 69, 72, 73, and 76-98 are pending in the application. No claims have been allowed. Claims 1, 22, 28, 68, 77, 84, 88, and 92 are independent. Claims 2, 3, 6, 13, 23, 24, 29, 30, 34-67, 70, 71, 74 and 75 have been cancelled without prejudice. Claims 1, 5, 7, 14, 22, 28, 68, 69, 72, 73 and 76 have been amended. Claims 77-98 have been added.

Response to Objection to Information Disclosure Statement

In the Action, the Examiner objects that certain references cited in prior filed Information Disclosure Statements were not listed with month and year of publication. A new Information Disclosure Statement showing detailed publication dates for the references in question will be submitted shortly.

Cited Art

The Action cites Pirsch, U.S. Patent No. 4,420,771 (hereinafter "the Pirsch patent") and Lee, U.S. Patent No. 5,668,547 (hereinafter "the Lee patent").

Claim Rejections under 35 U.S.C. § 101

The Action rejects claims 1, 4, 5, 7-12, 14-21, 68, and 69 under 35 U.S.C. § 101 as allegedly directed toward non-statutory subject matter. [*See* Action, at pages 3-5.] The Applicants respectfully disagree but have amended independent claims 1 and 68 to recite "a computing device that implements a video encoder" and "a computing device that implements a video decoder," respectively. Additionally, the Applicants have amended the claims such that the "processing" and "outputting" elements are performed by the "computing device" that implements either the encoder or decoder. Support for this language can be found at, for example, page 13, line 18 to page 14, line 20 of the Application. Each of claims 4, 5, 7-12, 14-21, 68, and 69 depends from either claim 1 or claim 68, and thus recites this language as well. Applicants believe that claims 1, 4, 5, 7-12, 14-21, 68, and 69 satisfy the "particular machine or transformation" test of *In re Bilski*, and as such are directed to statutory subject matter.

Therefore, the § 101 rejections of claims 1, 4, 5, 7-12, 14-21, 68, and 69 are moot. Claims 1, 4, 5, 7-12, 14-21, 68, and 69 are currently in condition for allowance. Applicants respectfully request that the rejections of claims 1, 4, 5, 7-12, 14-21, 68, and 69 be withdrawn and that the claims be allowed.

Applicants also note that, while previously rejected claims 2, 3, 23, 24, 29, and 30 are cancelled, new claims 77-101 recite "computer-readable physical storage media." In the rejection of claims 2, 3, 23, 24, 29, and 30, the Action alleged that the "storage medium" language of those claims covered non-statutory subject matter:

> [T]he specification, at page 14: line 9-12, defines the claimed storage medium as encompassing statutory material such as "magnetic disks" and "CD-ROMs", as well as "any other medium", which encompasses both the statutory media described within the paragraph, as well as non-statutory signal or carrier wave media such as the "communication medium described in page 14: lines 22-28.

[Action, at § 6, page 5.] Applicants respectfully traverse this interpretation of the specification and claims. Applicants note that the "any other medium" quote in the passage above is an incomplete quotation. The specification actually explicitly recites that "storage" includes "any other medium *which can be used to store information*." As such, Applicants respectfully argue that, even if, for the sake of argument, the "storage" language of the specification were read to include "communication media," that media would still need to be able to "be used to store information." Applicants respectfully argue that this does not include "non-statutory signal or carrier wave media" as the Action contends, as these cannot be used to *store* information.

However, in the interest of expediting prosecution of the claims, Applicants have drafted new independent claims 77, 84, 88, and 92 to recite "computer-readable *physical* storage media." Applicants believe that, with this language, independent claims 77, 84, 88, and 92, along with their dependent claims 78-83, 85-87, 89-91, and 93-98, are in condition for allowance. Applicants respectfully request that claims 77-98 be allowed.

Claim Rejections under 35 U.S.C. § 103(a)

The Action rejects claims 1, 4, 5, 7-12, 14-22, 25-28, 31-33, and 68, 69, 72, 73, and 76 under 35 U.S.C § 103(a) as being unpatentable over the Pirsch patent in view of the Lee patent. Applicants respectfully submit the claims in their present form are allowable over the cited art.

The Pirsch patent and the Lee patent, taken either separately or in combination, fail to teach or suggest all limitations of the claims. Claims 1, 22, 28, and 68 are independent.

Claims 1, 4, 5, 7-12, 20, 21, and 69

Claim 1, as amended, recites:

> *run-level encoding* a sequence of plural first-layer runs from the sequence of values as one or more second-layer runs and one or more second-layer levels.

[Emphasis added.] For example, at Section III.A the Application gives examples of starting with an initial sequence of values, and then performing run-level encoding on a series of runs created from that sequence:

> A given run level sequence includes a series of run level pairs. For example, consider the following original sequence of symbols.
> original sequence: 6 1 1 0 1 0 0 0 1 2 1 1 0 0 0 0 (1).
>
> This sequence is represented as the following sequence of run level pairs.
> run level pairs: 0 6 0 1 0 1 1 1 3 1 0 2 0 1 0 1 4 x (2),
>
> where the "x" indicates no level value for the last run level pair. . . . Continuing the example, the run level pairs are decomposed into a run sequence and a level sequence as follows.
> runs: 0 0 0 1 3 0 0 0 4 (3),
> levels: 6 1 1 1 1 2 1 1 x (4).
>
> . . . *The sequence of runs shown above as sequence (3) is represented as run level pairs for the run parts.*
> *run level pairs of runs: 3 1 0 3 3 4* *(5).*
> *The run level pairs for the runs are then further entropy encoded,* for example, using separate Huffman codes for the SRs and ISRs.

[Application, at page 22, line 17 to page 23, line 6; emphasis added.]

The Action, in rejecting claim 1, acknowledges that the Pirsch patent does not disclose "performing second-layer run-level coding on runs." [Action, page 6.] However, the Action argues that this is taught by the Lee patent:

> Lee teaches that it was known to perform run-level coding as an efficient variable-length coding technique and that it was known to further compress a first-layer run-level code.

[Action, at § 8, page 6.] The Action also argues that "[b]y substituting the run-level coding system of Lee for the custom VLC tables of runs and levels of Pirsch, the present invention is

achieved." [*Id.*] Applicants respectfully disagree with the Examiner's analysis of the Lee patent and its application in rejecting the claims.

The coding process described in the Lee patent uses run length encoding on sequences of run values, not run-level encoding, and therefore teaches away from "run-level encoding a sequence of plural first-layer runs from the sequence of values as one or more second-layer runs and one or more second-layer levels*" as recited in claim 1.* The Lee patent describes its process with reference to an example sequence as follows:

> Assuming that the input data stream inputted to the first buffer memory 10 shown in the drawing consists of the sequence,
>
> "0, l_1, 0, l_2, 0, l_3, 0, l_4, 0, l_5, l_6, l_7, 0, 0, l_8, 0, 0, l_9, 0, 0, l_{10}, 0, 0, l_{11}, . . . ",
>
> a first portion of the sequence, "0, l_1, 0, l_2, 0, l_3, 0, l_4, 0, l_5", which has five run-level pairs, i.e., ($1,l_1$), ($1,l_2$), ($1,l_3$), ($1,l_4$) and ($1,l_5$), having an identical runlength "1" and five levels l_1, l_2, l_3, l_4 and l_5, may be encoded as a combination of the runlength repetition index of 5, the runlength of 1 and the respective level values of l_1, l_2, l_3, l_4 and l_5. That is, the first portion of the sequence may be encoded as (5, 1, l_1, l_2, l_3, l_4, l_5).

[Lee patent, at column 4, lines 14-27; emphasis added.] Thus, as the Lee patent describes, the process of the Lee patent looks at run-level pairs, and then further encodes run values of these pairs as *the number (or length) of repeated runs of run values as well as the value of the repeated runs.* Hence, in the example above, the final encoding shows that, for the first five run-level pairs (each having a run value of 1), the sequence encodes a) a length of "5" for the number of repeated runs (the *length* of this run of run values), b) a value of "1" for the run *value* of the repeated runs, and then c) the sequence "l_1, l_2, l_3, l_4, l_5" which is the five level values found in those five run-level pairs.

Applicants respectfully note that this encoding process of the Lee patent, which must encode both the length of the run of run values as well as the value in the run of run values, uses run length encoding, not run level encoding. The application, at Section II.A., describes some differences between the two techniques. First, the Application describes run length encoding:

> In general, run length encoding replaces a series (i.e., run) of consecutive symbols having the same value *with the value and the length of the series.* For example, the sequence 3 3 0 0 0 1 0 0 0 0 is represented as value 3, length 2, value 0, length 3, value 1, length 1, and value 0, length 4.

[Application, at page 3, lines 13-16.] This technique is then contrasted with run level encoding:

> Run level encoding is similar to run length encoding in that runs of consecutive symbols of one value (typically, the predominant value) are replaced with lengths. *Unlike run length coding, however, other values are not represented with lengths. Instead, each run level pair represents a run of predominant values and a single non-predominant value.* For example, the sequence 3 3 0 0 0 1 0 0 0 0 0 0 0 0 0 1 is represented as length 0, level 3, length 0, level 3, length 3, level 1, length 9, level 1.

[Application, at page 3, lines 25-32.]

In further encoding of run values, the process of the Lee patent, described above, includes the *value* of each run it describes (rather than relying on a run of a particular predominant value) and encodes a run length for every set of repeated runs (rather than relying on the presence of a single non-predominant value following a run of the predominant value). This is seen more clearly in a review of the remainder of the example provided in the Lee patent:

> In a same manner, a second portion of the sequence, "1_6, 1_7", which has two run-level pairs, i.e., (0, 16) and (0, 1_7), having the runlength "0" and two levels 1_6 and 1_7, may be encoded as (2, 0, 1_6, 1_7); and a third portion of the sequence, "0, 0, 1_8, 0, 0, 1_9, 0, 0, 1_{10}, 0, 0, 1_{11}", which has four run-level pairs, i.e., (2, 1_8), (2, 1_9), (2, 1_{10}) and (2, 1_{11}), having an identical runlength "2" and four levels 1_8, 1_9, 1_{10} and 1_{11}, may be encoded as (4, 2, 1_8, 1_9, 1_{10}, 1_{11}). Consequently, in accordance with the present invention, the above input sequence can be encoded as (5, 1, 1_1, 1_2, 1_3, 1_4, 1_5), (2, 0, 1_6, 1_7), (4, 2, 1_8, 1_9, 1_{10}, 1_{11}).

[Lee patent, at column 4, lines 27-36.] Thus, the process of the Lee patent encodes not only lengths of runs of run values, but also encodes different values for each run of run values. In the example, this means it records a run of length 5 with a value of 1 for the first five pairs, a run of length 2 with a value of 0 for the second two pairs, and finally a run of length 4 with a value of 2 for the last four pairs. At most, because it encodes both the length and value for each run of run values, the process of the Lee patent is performing run length encoding of run values. Indeed, the Lee patent, by teaching run length encoding on top of a system that already uses run level encoding for its initial sequence of values, *teaches away* from using a second-layer run level encoding. The Lee patent thus does not teach or suggest the above-quoted language of claim 1.

As noted above, the Examiner acknowledges that the Pirsch patent does not disclose "performing second-layer run-level coding on runs." [Action, page 6.] For these reasons, even in combination, the Pirch and Lee patents do not teach or suggest the above-quoted language of claim 1.

The Pirsch patent and the Lee patent, taken either separately or in combination, do not teach or suggest all elements of claim 1. Therefore, claim 1, as well as claims 4, 5, 7-12, 20, 21, and 69, which depend from claim 1 and thus recite the above-quoted language of claim 1, are allowable over the Pirsch patent and the Lee patent. Applicants will not belabor the merits of the separate patentability of dependent claims 4, 5, 7-12, 20, 21, and 69. Applicants request that the rejections of claims 1, 4, 5, 7-12, 20, 21, and 69 be withdrawn and that the claims be allowed.

Claim 22, 25-27, and 72

Claim 22, as amended, recites:

> *run-level decoding* one or more second-layer runs and one or more second-layer levels that represent one or more first-layer runs for the sequence of frequency transform coefficients.

[Emphasis added.] The Action rejects claim 22 simultaneously with claim 1 and cites the same passages of the Pirsch patent and the Lee patent. [*See*, Action, at §8, page 6.] For at least the reasons discussed above with respect to claim 1, Applicants respectfully assert that the rejection of claim 22 (and its dependent claims 25-27 and 72) over the Pirsch patent and the Lee patent is improper. Applicants will not belabor the merits of the separate patentability of dependent claims 25-27 and 72. Claims 22, 25-27, and 72 are thus allowable and Applicants request their allowance.

Claim 28, 31-33, and 73

Claim 28, as amended, recites:

> *run-level encoding* one or more first-layer levels as one or more second-layer runs and one or more second-layer levels.

[Emphasis added.] In rejecting claim 28, the Examiner writes that the Pirsch patent "teaches a run-level coder in which further variable-length coding is performed on runs and levels." [Action, page 6.] The Action, in its rejection of claim 28, later cites only to a portion of the Pirsch patent that discloses "magnitudes or values of words which make up the non-frequent value runs." [Action, at § 8, page 8, citing the Pirsch patent at column 2, lines 1-3.] Because the Action does not cite any additional passages of either the Pirsch patent or the Lee patent,

Applicants assume the rejection uses the arguments the Examiner made with respect to the rejection of claims 1 and 22.

Even if, for the sake of argument, the Pirsch patent discloses coding/decoding that uses runs and levels, the Pirsch patent at most discloses further *variable length* coding/decoding of the run and level information. *Variable length* coding of run/level information is different than, and leads away from, "run-level encoding one or more first-layer levels as one or more second-layer runs and one or more second-layer levels." Even if, for the sake of argument, the Pirsch patent discloses "first-layer levels," variable length coding of such level information is different than run-level coding of first-layer levels as second-layer run(s) and second-layer level(s), as in claim 28.

The Lee patent fails to remedy these deficiencies of the Pirsch patent. As noted above, the Lee patent at most describes a variation of *run length* coding after initial run-level coding, not "*run-level encoding* one or more first-layer levels as one or more second-layer runs and one or more second-layer levels," as recited in claim 28. Applicants further note that the process of the Lee patent does not teach any sort of further encoding for "first-layer levels" as recited in claim 28. Instead, as discussed above with reference to the example from the Lee patent, the Lee patent describes further encoding of *run values* from a first-layer run level encoding. *Levels* from that encoding, such as the sequence "l_1, l_2, l_3, l_4, l_5" from the last tuple (5, 1, l_1, l_2, l_3, l_4, l_5), are not further encoded with run length coding.

For at least these reasons, the rejection of claim 28 (and its dependent claims 31-33 and 73) over the Pirsch patent and the Lee patent is improper. Applicants will not belabor the merits of the separate patentability of dependent claims 31-33 and 73. Claims 28, 31-33, and 73 are thus allowable and Applicants request their allowance.

Claim 68

Claim 68, as amended, recites:

> *run-level decoding* a sequence of one or more second-layer runs and one or more second-layer levels resulting in plural first-layer levels for the sequence of values.

[Emphasis added.] The Action rejects claim 68 simultaneously with claim 28 and over the same passages of the Pirsch patent and the Lee patent. [*See*, Action, at §8, page 8.] For at least the

reasons discussed above with respect to claim 28, Applicants respectfully assert that the rejection of claim 68 (and its dependent claims 14-19 and 76) over the Pirsch patent and the Lee patent is improper. Applicants will not belabor the merits of the separate patentability of dependent claims 14-19 and 76. Claims 68, 14-19 and 76 are thus allowable and Applicants request their allowance.

New claims 77-98

Independent claims 77, 84, 88, and 92 are each directed to "computer-readable physical storage media" but recite limitations similar to those in independent claims 1, 22, 28, and 68, respectively, which were discussed above. For example, claim 77 recites:

> run-level encoding a sequence of plural first-layer runs from the sequence of values as one or more second-layer runs and one or more second-layer levels.

This language is identical to the corresponding language of claim 1. Claims 84, 88, and 92 are likewise similar to claims 22, 28, and 68, respectively. Thus, for at least the reasons discussed above with respect to claims 22, 28, and 68, Applicants respectfully assert that claims 77, 84, 88, and 92, as well as their dependent claims 78-83, 85-87, 89-91, and 93-98, are allowable over the Pirsch patent and the Lee patent. Applicants will not belabor the merits of the separate patentability of claims 77-98. Claims 77-98 are thus allowable and Applicants request their allowance.

Interview Request

If the claims are not found by the Examiner to be allowable, the Examiner is requested to call the undersigned attorney to set up an interview to discuss this application.

Conclusion

The claims in their present form should be allowable. Such action is respectfully requested.

Respectfully submitted,

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